UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5 CHICAGO REGIONAL LABORATORY

536 SOUTH CLARK STREET

CHICAGO, ILLINOIS 60605

LABORATORY ACCREDITATION BUREAU ACCREDITED ISO/IEC 17025
Certificate # L2280 Testing

Date: **1/29/2015**

Subject: **Review of Region 5 Data for BP Whiting Refinery**

To: **Air Division, US EPA Region 5**
77 West Jackson Boulevard
Chicago, IL 60605

From: **Wayne Whipple, Analyst**
US EPA Region 5 Chicago Regional Laboratory

The data transmitted under this cover memo successfully passed CRL's data review procedures as documented in the current Quality Management Plan and applicable Standard Operating Procedures. In accordance with EPA's *Guidance on Environmental Data Verification and Data Validation* (Document EPA QA/G-8), CRL verified and validated the data but does not perform data quality assessment based on project plans.

This report was reviewed and the information provided herein accurately represents the analysis performed.

X Wayne J. Whipple 29 January, 2015

Please contact the analyst with any technical report issues, Amanda Wroble at (312)-353-0375 for sample project concerns, and Sylvia Griffin at (312)-353-9073 with data transmittal questions. Thank you.

Attached are Results for: BP Whiting Refinery

/ /

Data Management Coordinator and DateTransmitted

Analyses included in this report:

Air Toxics Reimer 5

Environmental Protection Agency Region 5

Chicago Regional Laboratory

536 South Clark Street, Chicago, IL 60605
Phone:(312)353-8370 Fax:(312)886-2591

Air Division, US EPA Region 5	Project: BP Whiting Refinery	
77 West Jackson Boulevard	Project Number: [none]	**Reported:**
Chicago IL, 60605	Project Manager: Motria Caudill	Jan-29-15 15:33

Analysis Case Narrative for Volatile Organic Compounds (VOC) Air Toxics

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General Information

Three 15 liter and two six liter canisters were received in good condition on October 23, 2014 for the BP Whiting study. The samples met hold time.

The samples were analyzed for VOC Air Toxics using SOP MS-005 Revision 6 with cold trap dehydration preconcentrator on Pegasus. (Reference Method US EPA TO-15). Three pen and ink changes MS005 r6.0-PI01, -PI02, PI03 for including the LECO Pegasus as an instrument with an updated target compound list, using the manufacturer's tune criteria in place of a BFB tune check and updated limits to the sample monitoring compounds respectively.

Data are reported to reporting limit of 25 pptv. Any data that does not meet this criteria are listed and explained below. This data meets the data quality objectives of the *Quality Assurance Project Plan EPA Region 5 Sampling Method Comparison*. The plan is requesting at least 35 pptv reporting limit. All data quality objectives have been met for this plan unless explained below.

Standard Operating Procedures (SOP) and Method Deviations

Any contamination that may affect a sample result from a method blank or canister blank is qualified B or BC and is explained in the LIMS report.

Recovery results for the CCVs are followed from the SOP and not the final report.

Sample Analysis and Results

The requested reporting limits are 35 pptv so the reporting limits are slightly lower at the LIMS nominal limit of 25 pptv unless blank contamination from the system or canisters causes an increase. Two system monitoring compounds, 1,1,1-trichloroethane and dichlorotetrafluoroethane reporting limits have been set to extremely low limits for tracking purposes but they are flagged as estimated. They are at global background levels.

Quality Control

Propene is qualified as research because the analyte has not completed the demonstration of competency for the

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instrument it was analyzed on and hexachlorobutadiene and carbon disulfide have not been reported for the same reason. Propene is also flagged K as a potential high bias because there is a smaller amount of propane in the sample that may influence the propene quantitation ion increasing the result for propene.

1,3-Butadiene is reported as a high bias because of a coelution of an unknown hydrocarbon that cannot be spectrally resolved.

The acetone result for the duplicate is above the calibration curve. All Acetone's results are flagged as estimated because the initial demonstration of competency for the instrument did not pass CRL criteria and there is no further qualification necessary.

Isopropyl alcohol was present in the blank and samples -02, 03, 04, and 05 within a factor of 5 so each result is qualified as a high bias. The duplicate was above calibration so it is qualified as estimated, J.

Naphthalene is flagged as estimated because the performance of the analytical system is not as reliable having an acceptable calibration response above 250 pptv for that late eluting compound and it fails the second source calibration check (ICV).

Acrolein colelutes with at least two interfering hydrocarbons that cannot be fully spectrally resolved and therefore is most likely overestimated. The compound is flagged K as potentially high biased.

1,1,1-trichloroethane and dichlorotetrafluoroethane are reported below the detection limit for tracking of the sample monitoring compounds. The result is within the expected global results, although is still flagged as estimated because it is below the detection limit. The result is also within 5 times the blank result but it is already flagged as estimated so no further action is required.

Ethanol and 4-methyl-2-pentanone failed the initial calibration verification and is flagged J as estimated.

4-ethyltoluene is coeluting with another aromatic hydrocarbon that is present in both the sample and duplicate analysis that should cause the result to be biased high and therefore it is flagged K.

The reporting limits for 1,2,4-trichlorobenzene were raise in sample -01 and -05 to account for high blank contamination that is most likely causing interferences to the level detected in the sample. The duplicate is has a reported result that is greater than a factor of two from the source result.

1,1,2-trichlorethane is missing a calibration at the 20 pptv level and therefore the reporting limit is raised to the 50 pptv level.

Chloromethane has it's reporting level raised to 50 pptv because of the lower calibration standards did not meet the SOP criteria and propene has it's reporting limit raised to 100 pptv for the same reason.

Canister Certification Blanks for three of the five samples were analyzed and included in this package. Two of the blanks were not analyzed because of the necessary turn-around-time. Canisters checks for canisters 1417 and 1418 containing samples 1410029-03 and -01 respectively are not available.

Environmental Protection Agency Region 5

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ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
4	1410029-01	Air	Oct-23-14 09:00	Oct-23-14 13:00
1	1410029-02	Air	Oct-23-14 09:40	Oct-23-14 13:00
3	1410029-03	Air	Oct-23-14 10:15	Oct-23-14 13:00
2	1410029-04	Air	Oct-23-14 11:01	Oct-23-14 13:00
2	1410029-05	Air	Oct-23-14 11:01	Oct-23-14 13:00

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Chicago IL, 60605	Project Manager: Motria Caudill	Jan-29-15 15:33

Air Toxics by GC/MS, EPA TO-15 (modified)
US EPA Region 5 Chicago Regional Laboratory

4 (1410029-01) Air Sampled: Oct-23-14 09:00 Received: Oct-23-14 13:00

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed
Propene	**1.50**	K, Research		0.100	ppbv	1	B410091	Oct-23-14	Oct-28-14
Chloromethane	**0.509**			0.0500	"	"	"	"	"
Vinyl chloride	**U**			0.0250	"	"	"	"	"
1,3-butadiene	**0.0486**	K		0.0250	"	"	"	"	"
Bromomethane	**U**			0.0250	"	"	"	"	"
Chloroethane	**U**			0.0250	"	"	"	"	"
Ethanol	**1.26**	J		0.0250	"	"	"	"	"
Acrolein	**0.405**	K		0.0250	"	"	"	"	"
1,1-Dichloroethene	**U**			0.0250	"	"	"	"	"
Methylene chloride	**0.101**			0.0250	"	"	"	"	"
Methyl tert-butyl ether	**U**			0.0250	"	"	"	"	"
1,1-Dichloroethane	**U**			0.0250	"	"	"	"	"
Vinyl acetate	**U**			0.0250	"	"	"	"	"
Hexane	**0.324**			0.0250	"	"	"	"	"
2-Butanone	**0.224**			0.0250	"	"	"	"	"
cis-1,2-Dichloroethene	**U**			0.0250	"	"	"	"	"
trans-1,2-Dichloroethene	**U**			0.0250	"	"	"	"	"
Chloroform	**0.0261**	B		0.0250	"	"	"	"	"
Ethyl acetate	**0.0700**			0.0250	"	"	"	"	"
1,2-Dichloroethane	**U**			0.0250	"	"	"	"	"
Cyclohexane	**0.179**			0.0250	"	"	"	"	"
Tetrahydrofuran	**U**			0.0250	"	"	"	"	"
Benzene	**0.189**			0.0250	"	"	"	"	"
n-Heptane	**0.116**			0.0250	"	"	"	"	"
1,2-Dichloropropane	**U**			0.0250	"	"	"	"	"
Trichloroethene	**U**			0.0250	"	"	"	"	"
Bromodichloromethane	**U**			0.0250	"	"	"	"	"
Methyl methacrylate	**U**			0.0250	"	"	"	"	"
1,4-Dioxane	**U**			0.0250	"	"	"	"	"
cis-1,3-Dichloropropene	**U**			0.0250	"	"	"	"	"
4-Methyl-2-pentanone	**U**	J		0.0250	"	"	"	"	"
trans-1,3-Dichloropropene	**U**			0.0250	"	"	"	"	"
1,1,2-Trichloroethane	**U**			0.0500	"	"	"	"	"
Dibromochloromethane	**U**			0.0250	"	"	"	"	"
Toluene	**0.373**			0.0250	"	"	"	"	"
2-Hexanone	**U**			0.0250	"	"	"	"	"

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Air Toxics by GC/MS, EPA TO-15 (modified)
US EPA Region 5 Chicago Regional Laboratory

4 (1410029-01) Air Sampled: Oct-23-14 09:00 Received: Oct-23-14 13:00

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed
1,2-Dibromoethane (EDB)	**U**			0.0250	ppbv	1	B410091	Oct-23-14	Oct-28-14
Tetrachloroethene	**U**			0.0250	"	"	"	"	"
Chlorobenzene	**U**			0.0250	"	"	"	"	"
Ethylbenzene	**0.0462**			0.0250	"	"	"	"	"
m+p-Xylene	**0.133**			0.0500	"	"	"	"	"
Bromoform	**U**			0.0250	"	"	"	"	"
Styrene	**U**			0.0250	"	"	"	"	"
1,1,2,2-Tetrachloroethane	**U**			0.0250	"	"	"	"	"
o-Xylene	**0.0520**			0.0250	"	"	"	"	"
4-ethyltoluene	**0.0543**	K		0.0250	"	"	"	"	"
1,3,5-Trimethylbenzene	**U**			0.0250	"	"	"	"	"
1,2,4-Trimethylbenzene	**0.0485**			0.0250	"	"	"	"	"
1,3-Dichlorobenzene	**U**			0.0250	"	"	"	"	"
Benzyl chloride	**U**			0.0250	"	"	"	"	"
1,4-Dichlorobenzene	**U**			0.0250	"	"	"	"	"
1,2-Dichlorobenzene	**U**			0.0250	"	"	"	"	"
1,2,4-Trichlorobenzene	**U**			0.0440	"	"	"	"	"
Naphthalene	**0.979**	J		0.250	"	"	"	"	"

Surogate	Result		%REC	%REC Limits	Batch	Prepared	Analyzed
Surrogate: Dichlorodifluoromethane	0.458		*90%*	*70-130*	"	"	"
Surrogate: Dichlorotetrafluoroethane	0.0154	J	*77%*	*70-130*	"	"	"
Surrogate: Trichlorofluoromethane	0.213		*91%*	*70-130*	"	"	"
Surrogate: 1,1,2-trichloro-1,2,2-trifluoroethane (F	0.0677		*94%*	*70-130*	"	"	"
Surrogate: 1,1,1-Trichloroethane	5.58E-3	J	*140%*	*70-130*	"	"	"
Surrogate: Carbon tetrachloride	0.0731		*88%*	*70-130*	"	"	"

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Air Toxics by GC/MS, EPA TO-15 (modified)
US EPA Region 5 Chicago Regional Laboratory

4 (1410029-01RE1) Air Sampled: Oct-23-14 09:00 Received: Oct-23-14 13:00

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed
Isopropyl alcohol	**4.36**	J		0.125	ppbv	5	B410091	Oct-23-14	Oct-28-14
Acetone	**1.77**	J		0.125	"	"	"	"	"

1 (1410029-02) Air Sampled: Oct-23-14 09:40 Received: Oct-23-14 13:00

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed
Propene	**0.669**	K, Research		0.100	ppbv	1	B410091	Oct-23-14	Oct-28-14
Chloromethane	**0.542**			0.0500	"	"	"	"	"
Vinyl chloride	**U**			0.0250	"	"	"	"	"
1,3-butadiene	**0.0346**	B, K		0.0250	"	"	"	"	"
Bromomethane	**U**			0.0250	"	"	"	"	"
Chloroethane	**U**			0.0250	"	"	"	"	"
Ethanol	**1.14**	J		0.0250	"	"	"	"	"
Acrolein	**0.355**	K		0.0250	"	"	"	"	"
Isopropyl alcohol	**0.220**	J, K		0.0250	"	"	"	"	"
Acetone	**1.47**	J		0.0250	"	"	"	"	"
1,1-Dichloroethene	**U**			0.0250	"	"	"	"	"
Methylene chloride	**0.0732**			0.0250	"	"	"	"	"
Methyl tert-butyl ether	**U**			0.0250	"	"	"	"	"
1,1-Dichloroethane	**U**			0.0250	"	"	"	"	"
Vinyl acetate	**U**			0.0250	"	"	"	"	"
Hexane	**0.337**			0.0250	"	"	"	"	"
2-Butanone	**0.227**			0.0250	"	"	"	"	"
cis-1,2-Dichloroethene	**U**			0.0250	"	"	"	"	"
trans-1,2-Dichloroethene	**U**			0.0250	"	"	"	"	"
Chloroform	**U**			0.0250	"	"	"	"	"
Ethyl acetate	**U**			0.0250	"	"	"	"	"
1,2-Dichloroethane	**U**			0.0250	"	"	"	"	"
Cyclohexane	**0.252**			0.0250	"	"	"	"	"
Tetrahydrofuran	**U**			0.0250	"	"	"	"	"
Benzene	**0.173**			0.0250	"	"	"	"	"
n-Heptane	**0.167**			0.0250	"	"	"	"	"
1,2-Dichloropropane	**U**			0.0250	"	"	"	"	"
Trichloroethene	**U**			0.0250	"	"	"	"	"
Bromodichloromethane	**U**			0.0250	"	"	"	"	"

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Air Toxics by GC/MS, EPA TO-15 (modified)
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1 (1410029-02) Air Sampled: Oct-23-14 09:40 Received: Oct-23-14 13:00

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed
Methyl methacrylate	**U**			0.0250	ppbv	1	B410091	Oct-23-14	Oct-28-14
1,4-Dioxane	**U**			0.0250	"	"	"	"	"
cis-1,3-Dichloropropene	**U**			0.0250	"	"	"	"	"
4-Methyl-2-pentanone	**U**	J		0.0250	"	"	"	"	"
trans-1,3-Dichloropropene	**U**			0.0250	"	"	"	"	"
1,1,2-Trichloroethane	**U**			0.0500	"	"	"	"	"
Dibromochloromethane	**U**			0.0250	"	"	"	"	"
Toluene	**0.383**			0.0250	"	"	"	"	"
2-Hexanone	**U**			0.0250	"	"	"	"	"
1,2-Dibromoethane (EDB)	**U**			0.0250	"	"	"	"	"
Tetrachloroethene	**U**			0.0250	"	"	"	"	"
Chlorobenzene	**U**			0.0250	"	"	"	"	"
Ethylbenzene	**0.0529**			0.0250	"	"	"	"	"
m+p-Xylene	**0.149**			0.0500	"	"	"	"	"
Bromoform	**U**			0.0250	"	"	"	"	"
Styrene	**U**			0.0250	"	"	"	"	"
1,1,2,2-Tetrachloroethane	**U**			0.0250	"	"	"	"	"
o-Xylene	**0.0555**			0.0250	"	"	"	"	"
4-ethyltoluene	**0.0523**	K		0.0250	"	"	"	"	"
1,3,5-Trimethylbenzene	**U**			0.0250	"	"	"	"	"
1,2,4-Trimethylbenzene	**0.0505**			0.0250	"	"	"	"	"
1,3-Dichlorobenzene	**U**			0.0250	"	"	"	"	"
Benzyl chloride	**U**			0.0250	"	"	"	"	"
1,4-Dichlorobenzene	**U**			0.0250	"	"	"	"	"
1,2-Dichlorobenzene	**U**			0.0250	"	"	"	"	"
1,2,4-Trichlorobenzene	**U**			0.0250	"	"	"	"	"
Naphthalene	**0.703**	B, J		0.250	"	"	"	"	"

Surogate	Result		%REC	%REC Limits	Batch	Prepared	Analyzed
Surrogate: Dichlorodifluoromethane	0.451		*88%*	*70-130*	"	"	"
Surrogate: Dichlorotetrafluoroethane	0.0160	B, J	*80%*	*70-130*	"	"	"
Surrogate: Trichlorofluoromethane	0.212		*90%*	*70-130*	"	"	"
Surrogate: 1,1,2-trichloro-1,2,2-trifluoroethane (F	0.0665		*92%*	*70-130*	"	"	"
Surrogate: 1,1,1-Trichloroethane	5.63E-3	B, J	*141%*	*70-130*	"	"	"
Surrogate: Carbon tetrachloride	0.0761		*92%*	*70-130*	"	"	"

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Air Toxics by GC/MS, EPA TO-15 (modified)
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3 (1410029-03) Air Sampled: Oct-23-14 10:15 Received: Oct-23-14 13:00

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed
Propene	**0.610**	K, Research		0.100	ppbv	1	B410091	Oct-23-14	Oct-28-14
Chloromethane	**0.509**			0.0500	"	"	"	"	"
Vinyl chloride	**U**			0.0250	"	"	"	"	"
1,3-butadiene	**0.0327**	B, K		0.0250	"	"	"	"	"
Bromomethane	**U**			0.0250	"	"	"	"	"
Chloroethane	**U**			0.0250	"	"	"	"	"
Ethanol	**1.37**	J		0.0250	"	"	"	"	"
Acrolein	**0.287**	K		0.0250	"	"	"	"	"
Isopropyl alcohol	**0.174**	J, K		0.0250	"	"	"	"	"
Acetone	**2.01**	J		0.0250	"	"	"	"	"
1,1-Dichloroethene	**U**			0.0250	"	"	"	"	"
Methylene chloride	**0.0803**			0.0250	"	"	"	"	"
Methyl tert-butyl ether	**U**			0.0250	"	"	"	"	"
1,1-Dichloroethane	**U**			0.0250	"	"	"	"	"
Vinyl acetate	**U**			0.0250	"	"	"	"	"
Hexane	**0.200**			0.0250	"	"	"	"	"
2-Butanone	**0.286**			0.0250	"	"	"	"	"
cis-1,2-Dichloroethene	**U**			0.0250	"	"	"	"	"
trans-1,2-Dichloroethene	**U**			0.0250	"	"	"	"	"
Chloroform	**0.0251**	B		0.0250	"	"	"	"	"
Ethyl acetate	**0.0578**			0.0250	"	"	"	"	"
1,2-Dichloroethane	**U**			0.0250	"	"	"	"	"
Cyclohexane	**0.114**			0.0250	"	"	"	"	"
Tetrahydrofuran	**U**			0.0250	"	"	"	"	"
Benzene	**0.154**			0.0250	"	"	"	"	"
n-Heptane	**0.0840**			0.0250	"	"	"	"	"
1,2-Dichloropropane	**U**			0.0250	"	"	"	"	"
Trichloroethene	**U**			0.0250	"	"	"	"	"
Bromodichloromethane	**U**			0.0250	"	"	"	"	"
Methyl methacrylate	**U**			0.0250	"	"	"	"	"
1,4-Dioxane	**U**			0.0250	"	"	"	"	"
cis-1,3-Dichloropropene	**U**			0.0250	"	"	"	"	"
4-Methyl-2-pentanone	**0.0264**	J		0.0250	"	"	"	"	"
trans-1,3-Dichloropropene	**U**			0.0250	"	"	"	"	"
1,1,2-Trichloroethane	**U**			0.0500	"	"	"	"	"
Dibromochloromethane	**U**			0.0250	"	"	"	"	"

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Air Toxics by GC/MS, EPA TO-15 (modified)
US EPA Region 5 Chicago Regional Laboratory

3 (1410029-03) Air Sampled: Oct-23-14 10:15 Received: Oct-23-14 13:00

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed
Toluene	**0.342**			0.0250	ppbv	1	B410091	Oct-23-14	Oct-28-14
2-Hexanone	**0.0266**	B		0.0250	"	"	"	"	"
1,2-Dibromoethane (EDB)	**U**			0.0250	"	"	"	"	"
Tetrachloroethene	**U**			0.0250	"	"	"	"	"
Chlorobenzene	**U**			0.0250	"	"	"	"	"
Ethylbenzene	**0.0468**			0.0250	"	"	"	"	"
m+p-Xylene	**0.128**			0.0500	"	"	"	"	"
Bromoform	**U**			0.0250	"	"	"	"	"
Styrene	**U**			0.0250	"	"	"	"	"
1,1,2,2-Tetrachloroethane	**U**			0.0250	"	"	"	"	"
o-Xylene	**0.0544**			0.0250	"	"	"	"	"
4-ethyltoluene	**0.0340**	K		0.0250	"	"	"	"	"
1,3,5-Trimethylbenzene	**U**			0.0250	"	"	"	"	"
1,2,4-Trimethylbenzene	**0.0272**			0.0250	"	"	"	"	"
1,3-Dichlorobenzene	**U**			0.0250	"	"	"	"	"
Benzyl chloride	**U**			0.0250	"	"	"	"	"
1,4-Dichlorobenzene	**U**			0.0250	"	"	"	"	"
1,2-Dichlorobenzene	**U**			0.0250	"	"	"	"	"
1,2,4-Trichlorobenzene	**U**			0.0250	"	"	"	"	"
Naphthalene	**0.629**	B, J		0.250	"	"	"	"	"

Surogate	Result		%REC	%REC Limits	Batch	Prepared	Analyzed
Surrogate: Dichlorodifluoromethane	0.446		*87%*	*70-130*	"	"	"
Surrogate: Dichlorotetrafluoroethane	0.0189	B, J	*94%*	*70-130*	"	"	"
Surrogate: Trichlorofluoromethane	0.220		*94%*	*70-130*	"	"	"
Surrogate: 1,1,2-trichloro-1,2,2-trifluoroethane (F	0.0710		*99%*	*70-130*	"	"	"
Surrogate: 1,1,1-Trichloroethane	9.39E-3	B, J	*235%*	*70-130*	"	"	"
Surrogate: Carbon tetrachloride	0.0828		*100%*	*70-130*	"	"	"

Environmental Protection Agency Region 5
Chicago Regional Laboratory

536 South Clark Street, Chicago, IL 60605
Phone:(312)353-8370 Fax:(312)886-2591

Air Division, US EPA Region 5	Project: BP Whiting Refinery	
77 West Jackson Boulevard	Project Number: [none]	**Reported:**
Chicago IL, 60605	Project Manager: Motria Caudill	Jan-29-15 15:33

Air Toxics by GC/MS, EPA TO-15 (modified)
US EPA Region 5 Chicago Regional Laboratory

3 (1410029-03RE1) Air Sampled: Oct-23-14 10:15 Received: Oct-23-14 13:00

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed
Acetone	**1.68**	J		0.125	ppbv	5	B410091	Oct-23-14	Oct-29-14

2 (1410029-04) Air Sampled: Oct-23-14 11:01 Received: Oct-23-14 13:00

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed
Propene	**0.543**	K, Research		0.100	ppbv	1	B410091	Oct-23-14	Oct-29-14
Chloromethane	**0.475**			0.0500	"	"	"	"	"
Vinyl chloride	**U**			0.0250	"	"	"	"	"
1,3-butadiene	**U**	K		0.0250	"	"	"	"	"
Bromomethane	**U**			0.0250	"	"	"	"	"
Chloroethane	**U**			0.0250	"	"	"	"	"
Ethanol	**1.22**	J		0.0250	"	"	"	"	"
Acrolein	**0.184**	K		0.0250	"	"	"	"	"
Isopropyl alcohol	**0.127**	J, K		0.0250	"	"	"	"	"
Acetone	**1.99**	J		0.0250	"	"	"	"	"
1,1-Dichloroethene	**U**			0.0250	"	"	"	"	"
Methylene chloride	**0.0719**			0.0250	"	"	"	"	"
Methyl tert-butyl ether	**U**			0.0250	"	"	"	"	"
1,1-Dichloroethane	**U**			0.0250	"	"	"	"	"
Vinyl acetate	**U**			0.0250	"	"	"	"	"
Hexane	**0.165**			0.0250	"	"	"	"	"
2-Butanone	**0.191**			0.0250	"	"	"	"	"
cis-1,2-Dichloroethene	**U**			0.0250	"	"	"	"	"
trans-1,2-Dichloroethene	**U**			0.0250	"	"	"	"	"
Chloroform	**U**			0.0250	"	"	"	"	"
Ethyl acetate	**0.0504**			0.0250	"	"	"	"	"
1,2-Dichloroethane	**U**			0.0250	"	"	"	"	"
Cyclohexane	**0.0823**			0.0250	"	"	"	"	"
Tetrahydrofuran	**U**			0.0250	"	"	"	"	"
Benzene	**0.134**			0.0250	"	"	"	"	"
n-Heptane	**0.0599**			0.0250	"	"	"	"	"
1,2-Dichloropropane	**U**			0.0250	"	"	"	"	"
Trichloroethene	**U**			0.0250	"	"	"	"	"
Bromodichloromethane	**U**			0.0250	"	"	"	"	"
Methyl methacrylate	**U**			0.0250	"	"	"	"	"

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Air Division, US EPA Region 5	Project: BP Whiting Refinery	
77 West Jackson Boulevard	Project Number: [none]	**Reported:**
Chicago IL, 60605	Project Manager: Motria Caudill	Jan-29-15 15:33

Air Toxics by GC/MS, EPA TO-15 (modified)
US EPA Region 5 Chicago Regional Laboratory

2 (1410029-04) Air Sampled: Oct-23-14 11:01 Received: Oct-23-14 13:00

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed
1,4-Dioxane	**U**			0.0250	ppbv	1	B410091	Oct-23-14	Oct-29-14
cis-1,3-Dichloropropene	**U**			0.0250	"	"	"	"	"
4-Methyl-2-pentanone	**U**	J		0.0250	"	"	"	"	"
trans-1,3-Dichloropropene	**U**			0.0250	"	"	"	"	"
1,1,2-Trichloroethane	**U**			0.0500	"	"	"	"	"
Dibromochloromethane	**U**			0.0250	"	"	"	"	"
Toluene	**0.228**			0.0250	"	"	"	"	"
2-Hexanone	**U**			0.0250	"	"	"	"	"
1,2-Dibromoethane (EDB)	**U**			0.0250	"	"	"	"	"
Tetrachloroethene	**U**			0.0250	"	"	"	"	"
Chlorobenzene	**U**			0.0250	"	"	"	"	"
Ethylbenzene	**0.0358**			0.0250	"	"	"	"	"
m+p-Xylene	**0.106**			0.0500	"	"	"	"	"
Bromoform	**U**			0.0250	"	"	"	"	"
Styrene	**U**			0.0250	"	"	"	"	"
1,1,2,2-Tetrachloroethane	**U**			0.0250	"	"	"	"	"
o-Xylene	**0.0365**			0.0250	"	"	"	"	"
4-ethyltoluene	**0.0262**	K		0.0250	"	"	"	"	"
1,3,5-Trimethylbenzene	**U**			0.0250	"	"	"	"	"
1,2,4-Trimethylbenzene	**U**			0.0250	"	"	"	"	"
1,3-Dichlorobenzene	**U**			0.0250	"	"	"	"	"
Benzyl chloride	**U**			0.0250	"	"	"	"	"
1,4-Dichlorobenzene	**U**			0.0250	"	"	"	"	"
1,2-Dichlorobenzene	**U**			0.0250	"	"	"	"	"
1,2,4-Trichlorobenzene	**U**			0.0250	"	"	"	"	"
Naphthalene	**0.566**	J, B		0.250	"	"	"	"	"

Surogate	Result		%REC	%REC Limits	Batch	Prepared	Analyzed
Surrogate: Dichlorodifluoromethane	0.449		*88%*	*70-130*	"	"	"
Surrogate: Dichlorotetrafluoroethane	0.0160	B, J	*80%*	*70-130*	"	"	"
Surrogate: Trichlorofluoromethane	0.215		*91%*	*70-130*	"	"	"
Surrogate: 1,1,2-trichloro-1,2,2-trifluoroethane (F	0.0678		*94%*	*70-130*	"	"	"
Surrogate: 1,1,1-Trichloroethane	5.92E-3	B, J	*148%*	*70-130*	"	"	"
Surrogate: Carbon tetrachloride	0.0778		*94%*	*70-130*	"	"	"

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Air Division, US EPA Region 5	Project: BP Whiting Refinery	
77 West Jackson Boulevard	Project Number: [none]	**Reported:**
Chicago IL, 60605	Project Manager: Motria Caudill	Jan-29-15 15:33

Air Toxics by GC/MS, EPA TO-15 (modified)
US EPA Region 5 Chicago Regional Laboratory

2 (1410029-05) Air Sampled: Oct-23-14 11:01 Received: Oct-23-14 13:00

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed
Propene	**0.476**	K, Research		0.100	ppbv	1	B410091	Oct-23-14	Oct-29-14
Chloromethane	**0.526**			0.0500	"	"	"	"	"
Vinyl chloride	**U**			0.0250	"	"	"	"	"
1,3-butadiene	**0.0275**	B, K		0.0250	"	"	"	"	"
Bromomethane	**U**			0.0250	"	"	"	"	"
Chloroethane	**U**			0.0250	"	"	"	"	"
Ethanol	**1.38**	J		0.0250	"	"	"	"	"
Acrolein	**0.389**	BC, K		0.0250	"	"	"	"	"
Isopropyl alcohol	**0.191**	J, K		0.0250	"	"	"	"	"
Acetone	**2.54**	J		0.0250	"	"	"	"	"
1,1-Dichloroethene	**U**			0.0250	"	"	"	"	"
Methylene chloride	**0.0805**			0.0250	"	"	"	"	"
Methyl tert-butyl ether	**U**			0.0250	"	"	"	"	"
1,1-Dichloroethane	**U**			0.0250	"	"	"	"	"
Vinyl acetate	**U**			0.0250	"	"	"	"	"
Hexane	**0.204**			0.0250	"	"	"	"	"
2-Butanone	**0.412**			0.0250	"	"	"	"	"
cis-1,2-Dichloroethene	**U**			0.0250	"	"	"	"	"
trans-1,2-Dichloroethene	**U**			0.0250	"	"	"	"	"
Chloroform	**U**			0.0250	"	"	"	"	"
Ethyl acetate	**0.0511**			0.0250	"	"	"	"	"
1,2-Dichloroethane	**U**			0.0250	"	"	"	"	"
Cyclohexane	**0.132**			0.0250	"	"	"	"	"
Tetrahydrofuran	**U**			0.0250	"	"	"	"	"
Benzene	**0.150**			0.0250	"	"	"	"	"
n-Heptane	**0.0818**			0.0250	"	"	"	"	"
1,2-Dichloropropane	**U**			0.0250	"	"	"	"	"
Trichloroethene	**U**			0.0250	"	"	"	"	"
Bromodichloromethane	**U**			0.0250	"	"	"	"	"
Methyl methacrylate	**U**			0.0250	"	"	"	"	"
1,4-Dioxane	**U**			0.0250	"	"	"	"	"
cis-1,3-Dichloropropene	**U**			0.0250	"	"	"	"	"
4-Methyl-2-pentanone	**U**	J		0.0250	"	"	"	"	"
trans-1,3-Dichloropropene	**U**			0.0250	"	"	"	"	"
1,1,2-Trichloroethane	**U**			0.0500	"	"	"	"	"
Dibromochloromethane	**U**			0.0250	"	"	"	"	"

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Air Division, US EPA Region 5	Project: BP Whiting Refinery	
77 West Jackson Boulevard	Project Number: [none]	**Reported:**
Chicago IL, 60605	Project Manager: Motria Caudill	Jan-29-15 15:33

Air Toxics by GC/MS, EPA TO-15 (modified)
US EPA Region 5 Chicago Regional Laboratory

2 (1410029-05) Air Sampled: Oct-23-14 11:01 Received: Oct-23-14 13:00

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed
Toluene	**0.300**			0.0250	ppbv	1	B410091	Oct-23-14	Oct-29-14
2-Hexanone	**0.0533**	BC		0.0250	"	"	"	"	"
1,2-Dibromoethane (EDB)	**U**			0.0250	"	"	"	"	"
Tetrachloroethene	**U**			0.0250	"	"	"	"	"
Chlorobenzene	**U**			0.0250	"	"	"	"	"
Ethylbenzene	**0.0447**			0.0250	"	"	"	"	"
m+p-Xylene	**0.122**			0.0500	"	"	"	"	"
Bromoform	**U**			0.0250	"	"	"	"	"
Styrene	**U**			0.0250	"	"	"	"	"
1,1,2,2-Tetrachloroethane	**U**			0.0250	"	"	"	"	"
o-Xylene	**0.0421**			0.0250	"	"	"	"	"
4-ethyltoluene	**0.0326**	K		0.0250	"	"	"	"	"
1,3,5-Trimethylbenzene	**U**			0.0250	"	"	"	"	"
1,2,4-Trimethylbenzene	**U**			0.0250	"	"	"	"	"
1,3-Dichlorobenzene	**U**			0.0250	"	"	"	"	"
Benzyl chloride	**0.0345**	B		0.0250	"	"	"	"	"
1,4-Dichlorobenzene	**0.0443**	B		0.0250	"	"	"	"	"
1,2-Dichlorobenzene	**U**			0.0250	"	"	"	"	"
1,2,4-Trichlorobenzene	**U**			0.0600	"	"	"	"	"
Naphthalene	**1.13**	B, J		0.250	"	"	"	"	"

Surogate	Result		%REC	%REC Limits	Batch	Prepared	Analyzed
Surrogate: Dichlorodifluoromethane	0.433		*85%*	*70-130*	"	"	"
Surrogate: Dichlorotetrafluoroethane	0.0143	B, J	*71%*	*70-130*	"	"	"
Surrogate: Trichlorofluoromethane	0.217		*93%*	*70-130*	"	"	"
Surrogate: 1,1,2-trichloro-1,2,2-trifluoroethane (F	0.0677		*94%*	*70-130*	"	"	"
Surrogate: 1,1,1-Trichloroethane	4.71E-3	B, J	*118%*	*70-130*	"	"	"
Surrogate: Carbon tetrachloride	0.0774		*93%*	*70-130*	"	"	"

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Chicago Regional Laboratory

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Air Division, US EPA Region 5	Project: BP Whiting Refinery	
77 West Jackson Boulevard	Project Number: [none]	**Reported:**
Chicago IL, 60605	Project Manager: Motria Caudill	Jan-29-15 15:33

Air Toxics by GC/MS, EPA TO-15 (modified)
US EPA Region 5 Chicago Regional Laboratory

2 (1410029-05RE1) Air Sampled: Oct-23-14 11:01 Received: Oct-23-14 13:00

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed
Acetone	**2.06**	BC, J		0.125	ppbv	5	B410091	Oct-23-14	Oct-29-14

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Air Division, US EPA Region 5	Project: BP Whiting Refinery	
77 West Jackson Boulevard	Project Number: [none]	**Reported:**
Chicago IL, 60605	Project Manager: Motria Caudill	Jan-29-15 15:33

Air Toxics by GC/MS, EPA TO-15 (modified) - Quality Control
US EPA Region 5 Chicago Regional Laboratory

Batch B410091 - ColdTrap Dehydration

Blank (B410091-BLK1) **Prepared: Oct-23-14 Analyzed: Oct-28-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Propene	**U**	Research		0.100	ppbv						
Chloromethane	**U**			0.0500	"						
Vinyl chloride	**U**			0.0250	"						
1,3-butadiene	**U**			0.0250	"						
Bromomethane	**U**			0.0250	"						
Chloroethane	**U**			0.0250	"						
Ethanol	**0.0464**	J		0.0250	"						
Acrolein	**U**			0.0250	"						
Isopropyl alcohol	**0.0480**	J		0.0250	"						
Acetone	**U**	J		0.0250	"						
1,1-Dichloroethene	**U**			0.0250	"						
Methylene chloride	**U**			0.0250	"						
Methyl tert-butyl ether	**U**			0.0250	"						
1,1-Dichloroethane	**U**			0.0250	"						
Vinyl acetate	**U**			0.0250	"						
Hexane	**U**			0.0250	"						
2-Butanone	**U**			0.0250	"						
cis-1,2-Dichloroethene	**U**			0.0250	"						
trans-1,2-Dichloroethene	**U**			0.0250	"						
Chloroform	**U**			0.0250	"						
Ethyl acetate	**U**			0.0250	"						
1,2-Dichloroethane	**U**			0.0250	"						
Cyclohexane	**U**			0.0250	"						
Tetrahydrofuran	**U**			0.0250	"						
Benzene	**U**			0.0250	"						
n-Heptane	**U**			0.0250	"						
1,2-Dichloropropane	**U**			0.0250	"						
Trichloroethene	**U**			0.0250	"						
Bromodichloromethane	**U**			0.0250	"						
Methyl methacrylate	**U**			0.0250	"						
1,4-Dioxane	**U**			0.0250	"						
cis-1,3-Dichloropropene	**U**			0.0250	"						
4-Methyl-2-pentanone	**U**	J		0.0250	"						

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Air Division, US EPA Region 5	Project: BP Whiting Refinery	
77 West Jackson Boulevard	Project Number: [none]	**Reported:**
Chicago IL, 60605	Project Manager: Motria Caudill	Jan-29-15 15:33

Air Toxics by GC/MS, EPA TO-15 (modified) - Quality Control
US EPA Region 5 Chicago Regional Laboratory

Batch B410091 - ColdTrap Dehydration

Blank (B410091-BLK1) **Prepared: Oct-23-14 Analyzed: Oct-28-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
trans-1,3-Dichloropropene	**U**			0.0250	ppbv						
1,1,2-Trichloroethane	**U**			0.0500	"						
Dibromochloromethane	**U**			0.0250	"						
Toluene	**U**			0.0250	"						
2-Hexanone	**U**			0.0250	"						
1,2-Dibromoethane (EDB)	**U**			0.0250	"						
Tetrachloroethene	**U**			0.0250	"						
Chlorobenzene	**U**			0.0250	"						
Ethylbenzene	**U**			0.0250	"						
m+p-Xylene	**U**			0.0500	"						
Bromoform	**U**			0.0250	"						
Styrene	**U**			0.0250	"						
1,1,2,2-Tetrachloroethane	**U**			0.0250	"						
o-Xylene	**U**			0.0250	"						
4-ethyltoluene	**U**	K		0.0250	"						
1,3,5-Trimethylbenzene	**U**			0.0250	"						
1,2,4-Trimethylbenzene	**U**			0.0250	"						
1,3-Dichlorobenzene	**U**			0.0250	"						
Benzyl chloride	**U**			0.0250	"						
1,4-Dichlorobenzene	**U**			0.0250	"						
1,2-Dichlorobenzene	**U**			0.0250	"						
1,2,4-Trichlorobenzene	**0.0378**			0.0250	"						
Naphthalene	**0.473**	J		0.250	"						
Surrogate: Dichlorodifluoromethane	*U*				"	*0.5100*		*%*	*0-0*		
Surrogate: Dichlorotetrafluoroethane	*9.64E-3*	J			"	*2.000E-2*		*48%*	*0-0*		
Surrogate: Trichlorofluoromethane	*U*				"	*0.2350*		*%*	*0-0*		
Surrogate: 1,1,2-trichloro-1,2,2-trifluoroethane (Freon	*U*				"	*7.200E-2*		*%*	*0-0*		
Surrogate: 1,1,1-Trichloroethane	*9.03E-3*	J			"	*4.000E-3*		*226%*	*0-0*		
Surrogate: Carbon tetrachloride	*U*				"	*8.300E-2*		*%*	*0-0*		

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Air Division, US EPA Region 5	Project: BP Whiting Refinery	
77 West Jackson Boulevard	Project Number: [none]	**Reported:**
Chicago IL, 60605	Project Manager: Motria Caudill	Jan-29-15 15:33

Air Toxics by GC/MS, EPA TO-15 (modified) - Quality Control
US EPA Region 5 Chicago Regional Laboratory

Batch B410091 - ColdTrap Dehydration

LCS (B410091-BS1) **Prepared: Oct-23-14 Analyzed: Oct-28-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Propene	**0.480**	Research		0.0250	ppbv	0.5000		96%	76-112		
Chloromethane	**0.482**			0.0250	"	0.5000		96%	77.6-116		
Vinyl chloride	**0.467**			0.0250	"	0.5000		93%	77.4-117		
1,3-butadiene	**0.458**			0.0250	"	0.5000		92%	77.7-115		
Bromomethane	**0.476**			0.0250	"	0.5000		95%	75.2-117		
Chloroethane	**0.470**			0.0250	"	0.5000		94%	79.8-114		
Ethanol	**0.499**	J		0.0250	"	0.5000		100%	50-124		
Acrolein	**0.460**			0.0250	"	0.5000		92%	67.9-130		
Isopropyl alcohol	**0.460**	J		0.0250	"	0.5000		92%	81-106		
Acetone	**0.472**	J		0.0250	"	0.5000		94%	60-137		
1,1-Dichloroethene	**0.472**			0.0250	"	0.5000		94%	77.3-118		
Methylene chloride	**0.481**			0.0250	"	0.5000		96%	78.7-117		
Methyl tert-butyl ether	**0.459**			0.0250	"	0.5000		92%	79.1-118		
1,1-Dichloroethane	**0.478**			0.0250	"	0.5000		96%	79.8-117		
Vinyl acetate	**0.460**			0.0250	"	0.5000		92%	85-106		
Hexane	**0.462**			0.0250	"	0.5000		92%	70.1-121		
2-Butanone	**0.451**			0.0250	"	0.5000		90%	82-108		
cis-1,2-Dichloroethene	**0.466**			0.0250	"	0.5000		93%	78.1-115		
trans-1,2-Dichloroethene	**0.465**			0.0250	"	0.5000		93%	0-200		
Chloroform	**0.474**			0.0250	"	0.5000		95%	79.6-115		
Ethyl acetate	**0.455**			0.0250	"	0.5000		91%	0-200		
1,2-Dichloroethane	**0.470**			0.0250	"	0.5000		94%	79.8-115		
Cyclohexane	**0.438**			0.0250	"	0.5000		88%	72.5-119		
Tetrahydrofuran	**0.453**			0.0250	"	0.5000		91%	0-200		
Benzene	**0.449**			0.0250	"	0.5000		90%	75.7-118		
n-Heptane	**0.446**			0.0250	"	0.5000		89%	66.9-152		
1,2-Dichloropropane	**0.493**			0.0250	"	0.5000		99%	76.8-118		
Trichloroethene	**0.456**			0.0250	"	0.5000		91%	70.1-119		
Bromodichloromethane	**0.499**			0.0250	"	0.5000		100%	75.8-117		
Methyl methacrylate	**0.478**			0.0250	"	0.5000		96%	0-200		
1,4-Dioxane	**0.481**			0.0250	"	0.5000		96%	54.7-150		
cis-1,3-Dichloropropene	**0.504**			0.0250	"	0.5000		101%	75.5-115		
4-Methyl-2-pentanone	**0.480**	J		0.0250	"	0.5000		96%	62.9-133		
trans-1,3-Dichloropropene	**0.486**			0.0250	"	0.5000		97%	75.8-117		

Environmental Protection Agency Region 5
Chicago Regional Laboratory

536 South Clark Street, Chicago, IL 60605
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Air Division, US EPA Region 5	Project: BP Whiting Refinery	
77 West Jackson Boulevard	Project Number: [none]	**Reported:**
Chicago IL, 60605	Project Manager: Motria Caudill	Jan-29-15 15:33

Air Toxics by GC/MS, EPA TO-15 (modified) - Quality Control
US EPA Region 5 Chicago Regional Laboratory

Batch B410091 - ColdTrap Dehydration

LCS (B410091-BS1) **Prepared: Oct-23-14 Analyzed: Oct-28-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
1,1,2-Trichloroethane	**0.486**			0.0250	ppbv	0.5000		97%	92.3-106		
Dibromochloromethane	**0.534**			0.0250	"	0.5000		107%	69-132		
Toluene	**0.494**			0.0250	"	0.5000		99%	73.2-120		
2-Hexanone	**0.472**			0.0250	"	0.5000		94%	76-110		
1,2-Dibromoethane (EDB)	**0.485**			0.0250	"	0.5000		97%	75.5-118		
Tetrachloroethene	**0.480**			0.0250	"	0.5000		96%	67.1-125		
Chlorobenzene	**0.469**			0.0250	"	0.5000		94%	68.5-121		
Ethylbenzene	**0.458**			0.0250	"	0.5000		92%	74.9-118		
m+p-Xylene	**0.896**			0.0500	"	1.000		90%	79.8-121		
Bromoform	**0.473**			0.0250	"	0.5000		95%	72.4-119		
Styrene	**0.461**			0.0250	"	0.5000		92%	71.5-122		
1,1,2,2-Tetrachloroethane	**0.495**			0.0250	"	0.5000		99%	92-106		
o-Xylene	**0.454**			0.0250	"	0.5000		91%	77.6-124		
4-ethyltoluene	**0.460**	K		0.0250	"	0.5000		92%	96.7-122		
1,3,5-Trimethylbenzene	**0.450**			0.0250	"	0.5000		90%	74.4-121		
1,2,4-Trimethylbenzene	**0.471**			0.0250	"	0.5000		94%	71.9-126		
1,3-Dichlorobenzene	**0.472**			0.0250	"	0.5000		94%	67.9-132		
Benzyl chloride	**0.504**			0.0250	"	0.5000		101%	60.7-134		
1,4-Dichlorobenzene	**0.468**			0.0250	"	0.5000		94%	65.4-136		
1,2-Dichlorobenzene	**0.481**			0.0250	"	0.5000		96%	69.3-129		
1,2,4-Trichlorobenzene	**0.412**			0.0250	"	0.5000		82%	39.7-186		
Naphthalene	**0.488**	J		0.0250	"				40-200		
Surrogate: Dichlorodifluoromethane	*0.478*				"	*0.5000*		*96%*	*77.8-116*		
Surrogate: Dichlorotetrafluoroethane	*0.370*				"	*0.5000*		*74%*	*89-108*		
Surrogate: Trichlorofluoromethane	*0.480*				"	*0.5000*		*96%*	*78.6-114*		
Surrogate: 1,1,2-trichloro-1,2,2-trifluoroethane (Freon	*0.387*				"	*0.5000*		*77%*	*75.3-119*		
Surrogate: 1,1,1-Trichloroethane	*0.453*				"	*0.5000*		*91%*	*92.5-105*		
Surrogate: Carbon tetrachloride	*0.474*				"	*0.5000*		*95%*	*76.3-118*		

Environmental Protection Agency Region 5
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Air Division, US EPA Region 5	Project: BP Whiting Refinery	
77 West Jackson Boulevard	Project Number: [none]	**Reported:**
Chicago IL, 60605	Project Manager: Motria Caudill	Jan-29-15 15:33

Air Toxics by GC/MS, EPA TO-15 (modified) - Quality Control
US EPA Region 5 Chicago Regional Laboratory

Batch B410091 - ColdTrap Dehydration

LCS Dup (B410091-BSD1) **Prepared: Oct-23-14 Analyzed: Oct-29-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Propene	**0.479**	Research		0.100	ppbv	0.5000		96%	76-112	0.3	19.6
Chloromethane	**0.509**			0.0500	"	0.5000		102%	77.6-116	5	26.9
Vinyl chloride	**0.481**			0.0250	"	0.5000		96%	77.4-117	3	25.1
1,3-butadiene	**0.453**			0.0250	"	0.5000		91%	77.7-115	1	33.2
Bromomethane	**0.521**			0.0250	"	0.5000		104%	75.2-117	9	26.6
Chloroethane	**0.510**			0.0250	"	0.5000		102%	79.8-114	8	29.5
Ethanol	**0.454**	J		0.0250	"	0.5000		91%	50-124	9	200
Acrolein	**0.471**			0.0250	"	0.5000		94%	67.9-130	2	29.8
Isopropyl alcohol	**0.429**	J		0.0250	"	0.5000		86%	81-106	7	25
Acetone	**0.465**	J		0.0250	"	0.5000		93%	60-137	1	28.7
1,1-Dichloroethene	**0.497**			0.0250	"	0.5000		99%	77.3-118	5	15.9
Methylene chloride	**0.514**			0.0250	"	0.5000		103%	78.7-117	7	20.7
Methyl tert-butyl ether	**0.455**			0.0250	"	0.5000		91%	79.1-118	0.9	31.9
1,1-Dichloroethane	**0.512**			0.0250	"	0.5000		102%	79.8-117	7	13.1
Vinyl acetate	**0.457**			0.0250	"	0.5000		91%	85-106	0.7	200
Hexane	**0.452**			0.0250	"	0.5000		90%	70.1-121	2	43.5
2-Butanone	**0.460**			0.0250	"	0.5000		92%	82-108	2	25
cis-1,2-Dichloroethene	**0.492**			0.0250	"	0.5000		98%	78.1-115	5	29.6
trans-1,2-Dichloroethene	**0.497**			0.0250	"	0.5000		99%	0-200	7	25
Chloroform	**0.531**			0.0250	"	0.5000		106%	79.6-115	11	25.2
Ethyl acetate	**0.482**			0.0250	"	0.5000		96%	0-200	6	25
1,2-Dichloroethane	**0.519**			0.0250	"	0.5000		104%	79.8-115	10	24.6
Cyclohexane	**0.479**			0.0250	"	0.5000		96%	72.5-119	9	34.5
Tetrahydrofuran	**0.470**			0.0250	"	0.5000		94%	0-200	4	25
Benzene	**0.484**			0.0250	"	0.5000		97%	75.7-118	7	27.4
n-Heptane	**0.455**			0.0250	"	0.5000		91%	66.9-152	2	25
1,2-Dichloropropane	**0.542**			0.0250	"	0.5000		108%	76.8-118	9	25.3
Trichloroethene	**0.513**			0.0250	"	0.5000		103%	70.1-119	12	34.1
Bromodichloromethane	**0.544**			0.0250	"	0.5000		109%	75.8-117	9	26.5
Methyl methacrylate	**0.453**			0.0250	"	0.5000		91%	0-200	5	200
1,4-Dioxane	**0.481**			0.0250	"	0.5000		96%	54.7-150	0.2	58.6
cis-1,3-Dichloropropene	**0.481**			0.0250	"	0.5000		96%	75.5-115	5	31.1
4-Methyl-2-pentanone	**0.465**	J		0.0250	"	0.5000		93%	62.9-133	3	42
trans-1,3-Dichloropropene	**0.500**			0.0250	"	0.5000		100%	75.8-117	3	31.7

Environmental Protection Agency Region 5
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Air Division, US EPA Region 5	Project: BP Whiting Refinery	
77 West Jackson Boulevard	Project Number: [none]	**Reported:**
Chicago IL, 60605	Project Manager: Motria Caudill	Jan-29-15 15:33

Air Toxics by GC/MS, EPA TO-15 (modified) - Quality Control
US EPA Region 5 Chicago Regional Laboratory

Batch B410091 - ColdTrap Dehydration

LCS Dup (B410091-BSD1) **Prepared: Oct-23-14 Analyzed: Oct-29-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
1,1,2-Trichloroethane	**0.538**			0.0500	ppbv	0.5000		108%	92.3-106	10	11.5
Dibromochloromethane	**0.582**			0.0250	"	0.5000		116%	69-132	9	25
Toluene	**0.471**			0.0250	"	0.5000		94%	73.2-120	5	30.6
2-Hexanone	**0.477**			0.0250	"	0.5000		95%	76-110	1	46.8
1,2-Dibromoethane (EDB)	**0.533**			0.0250	"	0.5000		107%	75.5-118	9	31.5
Tetrachloroethene	**0.540**			0.0250	"	0.5000		108%	67.1-125	12	13.8
Chlorobenzene	**0.508**			0.0250	"	0.5000		102%	68.5-121	8	31.9
Ethylbenzene	**0.476**			0.0250	"	0.5000		95%	74.9-118	4	31.6
m+p-Xylene	**0.923**			0.0500	"	1.000		92%	79.8-121	3	28.9
Bromoform	**0.525**			0.0250	"	0.5000		105%	72.4-119	10	34.6
Styrene	**0.483**			0.0250	"	0.5000		97%	71.5-122	5	19.7
1,1,2,2-Tetrachloroethane	**0.554**			0.0250	"	0.5000		111%	92-106	11	11.5
o-Xylene	**0.467**			0.0250	"	0.5000		93%	77.6-124	3	28.7
4-ethyltoluene	**0.488**	K		0.0250	"	0.5000		98%	96.7-122	6	25
1,3,5-Trimethylbenzene	**0.481**			0.0250	"	0.5000		96%	74.4-121	7	29.8
1,2,4-Trimethylbenzene	**0.499**			0.0250	"	0.5000		100%	71.9-126	6	32.1
1,3-Dichlorobenzene	**0.519**			0.0250	"	0.5000		104%	67.9-132	9	37.9
Benzyl chloride	**0.481**			0.0250	"	0.5000		96%	60.7-134	5	48.3
1,4-Dichlorobenzene	**0.512**			0.0250	"	0.5000		102%	65.4-136	9	39.6
1,2-Dichlorobenzene	**0.525**			0.0250	"	0.5000		105%	69.3-129	9	34
1,2,4-Trichlorobenzene	**0.369**			0.0250	"	0.5000		74%	39.7-186	11	77.1
Naphthalene	**0.505**	J		0.250	"				40-200	3	200
Surrogate: Dichlorodifluoromethane	*0.510*				"	*0.5000*		*102%*	*77.8-116*		
Surrogate: Dichlorotetrafluoroethane	*0.392*				"	*0.5000*		*78%*	*89-108*		
Surrogate: Trichlorofluoromethane	*0.525*				"	*0.5000*		*105%*	*78.6-114*		
Surrogate: 1,1,2-trichloro-1,2,2-trifluoroethane (Freon	*0.419*				"	*0.5000*		*84%*	*75.3-119*		
Surrogate: 1,1,1-Trichloroethane	*0.506*				"	*0.5000*		*101%*	*92.5-105*		
Surrogate: Carbon tetrachloride	*0.521*				"	*0.5000*		*104%*	*76.3-118*		

Environmental Protection Agency Region 5
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Air Division, US EPA Region 5	Project: BP Whiting Refinery	
77 West Jackson Boulevard	Project Number: [none]	**Reported:**
Chicago IL, 60605	Project Manager: Motria Caudill	Jan-29-15 15:33

Air Toxics by GC/MS, EPA TO-15 (modified) - Quality Control
US EPA Region 5 Chicago Regional Laboratory

Batch B410091 - ColdTrap Dehydration

Duplicate (B410091-DUP1) **Source: 1410029-01** **Prepared: Oct-23-14 Analyzed: Oct-28-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
Propene	**1.44**	K, Research		0.100	ppbv		1.50			4	30
Chloromethane	**0.499**			0.0500	"		0.509			2	30
Vinyl chloride	**U**			0.0250	"		U				30
1,3-butadiene	**0.0453**	B, K		0.0250	"		0.0486			7	30
Bromomethane	**U**			0.0250	"		U				30
Chloroethane	**U**			0.0250	"		U				30
Ethanol	**1.12**	J		0.0250	"		1.26			12	40
Acrolein	**0.394**	K		0.0250	"		0.405			3	40
Isopropyl alcohol	**4.76**	J		0.0250	"		5.19			9	40
Acetone	**2.03**	J		0.0250	"		2.09			3	40
1,1-Dichloroethene	**U**			0.0250	"		U				30
Methylene chloride	**0.0990**			0.0250	"		0.101			2	30
Carbon disulfide	**Rejected**			0.0250	"		0.243			4	40
Methyl tert-butyl ether	**U**			0.0250	"		U				40
1,1-Dichloroethane	**U**			0.0250	"		U				30
Vinyl acetate	**U**			0.0250	"		U				40
Hexane	**0.307**			0.0250	"		0.324			5	30
2-Butanone	**0.229**			0.0250	"		0.224			2	50
cis-1,2-Dichloroethene	**U**			0.0250	"		U				30
trans-1,2-Dichloroethene	**U**			0.0250	"		U				30
Chloroform	**0.0331**	B		0.0250	"		0.0261			24	30
Ethyl acetate	**0.0721**			0.0250	"		0.0700			3	40
1,2-Dichloroethane	**0.0119**			0.0250	"		U				30
Cyclohexane	**0.178**			0.0250	"		0.179			1	30
Tetrahydrofuran	**U**			0.0250	"		U				40
Benzene	**0.190**			0.0250	"		0.189			0.9	30
n-Heptane	**0.109**			0.0250	"		0.116			7	30
1,2-Dichloropropane	**U**			0.0250	"		U				30
Trichloroethene	**U**			0.0250	"		U				30
Bromodichloromethane	**U**			0.0250	"		U				30
Methyl methacrylate	**U**			0.0250	"		U				40
1,4-Dioxane	**U**			0.0250	"		0.0113				40
cis-1,3-Dichloropropene	**U**			0.0250	"		U				30
4-Methyl-2-pentanone	**0.0148**	J		0.0250	"		U				40

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Air Division, US EPA Region 5	Project: BP Whiting Refinery	
77 West Jackson Boulevard	Project Number: [none]	**Reported:**
Chicago IL, 60605	Project Manager: Motria Caudill	Jan-29-15 15:33

Air Toxics by GC/MS, EPA TO-15 (modified) - Quality Control
US EPA Region 5 Chicago Regional Laboratory

Batch B410091 - ColdTrap Dehydration

Duplicate (B410091-DUP1) **Source: 1410029-01** **Prepared: Oct-23-14 Analyzed: Oct-28-14**

Analyte	Result	Flags / Qualifiers	MDL	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit
trans-1,3-Dichloropropene	**U**			0.0250	ppbv		U				30
1,1,2-Trichloroethane	**U**			0.0500	"		U				30
Dibromochloromethane	**U**			0.0250	"		U				30
Toluene	**0.386**			0.0250	"		0.373			3	30
2-Hexanone	**U**			0.0250	"		U				40
1,2-Dibromoethane (EDB)	**U**			0.0250	"		U				30
Tetrachloroethene	**U**			0.0250	"		U				30
Chlorobenzene	**U**			0.0250	"		U				30
Ethylbenzene	**0.0470**			0.0250	"		0.0462			2	30
m+p-Xylene	**0.136**			0.0500	"		0.133			2	30
Bromoform	**U**			0.0250	"		U				30
Styrene	**U**			0.0250	"		0.0138				30
1,1,2,2-Tetrachloroethane	**U**			0.0250	"		U				30
o-Xylene	**0.0498**			0.0250	"		0.0520			4	30
4-ethyltoluene	**0.0541**	K		0.0250	"		0.0543			0.3	30
1,3,5-Trimethylbenzene	**0.0103**			0.0250	"		0.0112			8	30
1,2,4-Trimethylbenzene	**0.0479**			0.0250	"		0.0485			1	30
1,3-Dichlorobenzene	**U**			0.0250	"		U				30
Benzyl chloride	**U**			0.0250	"		0.0182				30
1,4-Dichlorobenzene	**U**			0.0250	"		0.0119				30
1,2-Dichlorobenzene	**U**			0.0250	"		U				30
1,2,4-Trichlorobenzene	**0.0226**			0.0250	"		0.0437			64	30
Naphthalene	**0.762**	B, J		0.250	"		0.979			25	30
Surrogate: Dichlorodifluoromethane	*0.447*				*"*	*0.5100*		*88%*	*70-130*		
Surrogate: Dichlorotetrafluoroethane	*0.0158*	B, J			*"*	*2.000E-2*		*79%*	*70-130*		
Surrogate: Trichlorofluoromethane	*0.211*				*"*	*0.2350*		*90%*	*70-130*		
Surrogate: 1,1,2-trichloro-1,2,2-trifluoroethane (Freon	*0.0648*				*"*	*7.200E-2*		*90%*	*70-130*		
Surrogate: 1,1,1-Trichloroethane	*5.62E-3*	B, J			*"*	*4.000E-3*		*140%*	*70-130*		
Surrogate: Carbon tetrachloride	*0.0762*				*"*	*8.300E-2*		*92%*	*70-130*		

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Air Division, US EPA Region 5	Project: BP Whiting Refinery	
77 West Jackson Boulevard	Project Number: [none]	**Reported:**
Chicago IL, 60605	Project Manager: Motria Caudill	Jan-29-15 15:33

Notes and Definitions

Research	Samples analyzed while the method is under development and contain results of unknown quality. No SOP in place at time of data release. Client was notified and accepted the terms as stated.
R	Rejected
K	The identification of the analyte is acceptable; the reported value may be biased high. The actual value is expected to be less than the reported value.
J	The identification of the analyte is acceptable; the reported value is an estimate.
BC	Analyte is detected in the sample within 5x the amount detected in the canister certification blank and may have a high bias from residual contamination in the canister used to sample.
B	Analyte concentration is < 5x that in the associated method blank(s); this concentration may be a high-bias estimate.
U	Not Detected
NR	Not Reported